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GENTLEMEN: Undoubtedly the subject of modern surgical bacteriology and pathology has made, and will still further make, a most decided impression upon orthopedic surgery.

The discovery of the bacillus of tuberculosis, pus germs, and other forms of microscopic life, and their influence upon human tissues in a state of disease and health, has revolutionized surgical pathology and the treatment of wounds and lesions.

Among the older pathologists, inflammation was taught to be a diseased condition, and all of the various complications arising during the healing process were treated upon as a part of the inflammamatory process.

The definition of inflammation given by Palmer, of the University of Michigan, covers nearly two pages of his book. In this definition he includes every process, normal and abnormal, which takes place in the healing of wounds, including suppuration and sloughing, which we now recognize as complications.

Inflammation is recognized by the advanced pathologist to be a perfectly normal process of repair. For example, when an incised wound is made, the first process that takes place is an effusion of blood and its coagulation, then a rapid wandering of cells into this blood-clot occurs, together with rapid cell proliferation. These cells form themselves into lines between the cut ends of the tissues, for

the purpose of repair. Very soon organization takes place, new tissue is built up. After this, contraction takes place, capillaries are destroyed, epithelium grows over the surface, and we say the wound is healed.

This is now believed to be the normal process of repair. This is inflammation, and the process is as normal as the growth of the stag's horn. This reparative inflammation is necessary in all cases where injury has been inflicted. If at any time during this process of repair or normal inflammation, germ life is inoculated, another condition is at once established, and that moment marks the beginning of disease. If these germs are pus germs, they at once seize upon this inflammatory material, and they, with their ptomaines, destroy the whole. The wound has become infected, and disease is the result. This disease is suppuration.

If the germs of tuberculosis should be inoculated into this new inflammatory tissue, their growth immediately takes place. No pus is formed from the bacilli of tuberculosis, but the germs grow and as surely destroy this new inflammatory material as did the germs of suppuration.

Then we say that this normal inflammatory material has become diseased, a tubercular inoculation, producing a tubercular focus or disease, is the result. Then there is a vast difference between inflammation and disease.

Should these germs be pyogenic and the inoculation take place in the bone, a very rapid osteomyelitis with abscess is almost sure to result. If, on the contrary, the germs of tuberculosis come in contact with this area of normal inflammation, then so sure will this condition be a tubercular one. The process is insidious, producing destruction by ulceration or caries.

After a time, should inoculation be present, the new inflammatory material is destroyed, and its place taken by germs and the products of germ life; but just outside of this area of disease a new barrier of normal inflammatory material is thrown up by the tissues, similar to the first. This is normal embryonic material, into which germ life rapidly grows and destroys, and so the normal process of repair goes on just a little in advance of disease, or germ invasion, until after a time, as in the head of the femur, or in the body of a vertebra, a large portion of bone is destroyed.

To produce disease caused by germs, two conditions are essential: First, inflammatory material, which is made up of embryonic cells, and second, the presence of germ life. In the absence of either, such disease cannot occur.

In a given case, an injury is received to the joint or spine. This injury may be very slight in character. From the fact that greater pressure occurs at the ends of bones, in the inter-vertebral cartilage, and spongy portions of the bodies of the vertebra, the lesion is more likely to take place at this point.

Immediately following a slight injury, Nature attempts repair by means of normal inflammatory action, but should there be floating in the circulation germ life, either tubercular or pyogenic, inoculation of this area of inflammation is almost sure to take place. When it occurs, if the phagocytes, which are the wandering and the fixed tissue-cells, are weakened on account of the strumous condition of the child, they fail to destroy the germ. The germs then destroy the phagocytes and convert the area of normal inflammation into disease, with the symptoms of which we are all familiar.

If, however, germ life is destroyed by the phagocytes, repair goes on uninterrupted as in any other wound, and, after a longer or shorter period, the parts are restored to their normal condition.

During the period of active inflammation the symptoms are almost identical with those of disease. Understanding this, we can now account for the ephemeral forms of hip and Pott's disease. Then the term osteitis, which is so frequently used, should not be applied to indicate a diseased condition, but rather a normal process of repair. The term struma should be used to indicate a condition. Struma is a condition. The reason why one child is attacked by tuberculosis and another escapes under similar circumstances is because one is strumous and the other not.

The difference between these two children is similar to that of the celery which is grown in the trench, kept away from the light of the sun, making the succulent plant fit for the table, and the other, which is grown in the sun, building up strong woody fibre. The tender celery, which has but little woody fibre, cannot resist the sting of the insect which deposits its larvæ, while the other with its woody fibre can. One is strumous, and the other not. The difference between them is only in degree and quality. So it is with the

strumous child. He has either inherited an enfeebled condition, or has acquired it through bad nourishment and bad surroundings. The protoplasm which makes up the phagocytes of his body is enfeebled, and differs from that of the strong, well-nourished child with a good ancestry. The phagocytes of his body, consisting of enfeebled protoplasm, do not resist the attack of germ life—the result is inoculation, destruction, and death; whereas, in the strong non-strumous child, phagocytes destroy the germ.

Then we must conclude that struma is located in the protoplasm of the ultimate cell of the body, and measures the resistance of the individual to the attack of germ life. This is struma!

The process which takes place after the inoculation of the bacilli of tuberculosis produces tubercular disease unattended with pus. Pyogenic germs produce rapid purulent destruction and the formation of abscesses.

Tubercular cavities or foci of disease may become inoculated with pyogenic germs, which result in the rapid formation of abscess. The growth of the bacilli of tuberculosis is slow, while that of the pyogenic cocci is rapid.

This explains why a child may carry around a fluctuating tumor filled with tubercular material that remains quiescent or possibly diminishes in size, when in a single day it increases, becomes hot and possibly painful, and very soon ruptures, with the escape of a large quantity of pus and cheesy material.

In such cases an inoculation of pus germs has taken place into the area of tubercular disease. The powder magazine of tubercular disease finally, after months, received the fatal spark which precipitated the abscess. Both tubercular material and pus possess the power of destroying tissue with which they come in contact. This explains the extensive destruction of joints when allowed to macerate for weeks or months in these materials. Understanding all this (and these facts are established beyond a question), we should not hesitate to decide what should be done in a given case, and the knife and drainage should be freely used. The term scrofula has become obsolete—tuberculosis has taken its place. The term scrofula was a makeshift word; it was the quacks' stock in trade. The term scrofula, alteratives, and many other terms in medicine are the breastworks behind which ignorance skulks.

It is to be hoped that we will never again see in print the terms strumous or scrofulous joints. The term scrofula means nothing, and struma is a condition. Infection may take place from within the body or from without. From within by germs floating in the circulation, which have been carried there by the lymphatics of the mucous membrane; from without by the direct entrance of germ life through the denuded skin. Of late it has been discovered that one of the most frequent sources of infection is from the milk of tuberculous cows. The inoculation of Koch's lymph detects animals infected. Whole herds of cattle have been killed recently after the demonstration with Koch's lymph, and in every instance the animals were found suffering from general or local tuberculosis. This being the fact, we should look to the feeding of our orthopedic cases. Undoubtedly relapses are frequently produced by inoculation from milk. A case is nearly cured; the bacilli of tuberculosis have been entirely destroyed in the healing process or become encysted; the normal process of repair is still going on, with its myriad of embryonic cells at work to complete a cure. At this stage, if a child drinks a glass of milk contaminated with the bacilli of tuberculosis, inoculation is almost sure to take place, and a relapse follows. To prevent this, animals supplying milk for patients or institutions should be examined. The milk should be sterilized; but this does not destroy the products of germ life, and this deleterious material does harm.

THE PAST, PRESENT, AND FUTURE OF ORTHOPEDIC SURGERY.

The history of *orthopedy* and orthopedic surgery, like that of general surgery, is humiliating. For many centuries general surgery struggled with the people and the priest for the high position which it now occupies.

It is only within a few years that surgery was divorced from the barber shop, and even to this day throughout Europe are seen in front of these shops the three small brass basins—the sign of the barber—used by his predecessors to catch the blood that flowed from his suffering patients.

'Tis true that all along through the dark ages of the past, when manacles were put upon the brains of man, occasionally a great light shown through the rifted clouds. The wonderful original work of men of the character of Galen, Ambrose Paré and others

was a particular bright star in the dark-domed firmament of ignorance and religious superstition. The influence of the labors of such men upon modern surgery can hardly be estimated. And so we can trace the history of *orthopedy* through the slough-holes of bigotry and jealousy almost from the time of earliest man. Their work was confined to the application of appliances to overcome deformity when it was not considered a sacrilege to do so.

In looking over the literature upon the subject one becomes bewildered. The armamentarium of the ancient *orthopedist* was, at least, the equal of our present appliances in point of ingenuity and intricacy. And the braces used at the present time bearing the names of modern men, supposed to be modern inventions, are nothing more or less, with but few exceptions, than the revival of the old ideas of the past.

The orthopedist was always at war with the general surgeon. There never was a time when they could lie peacefully together in the same bed, excepting like the lion and the lamb—one inside the other, and the poor *orthopede* was always inside. The orthopedist was a mere bandagist, adjusting his appliances to the lame and the halt, regardless of pathology or etiology, and the surgeon of his day was but little better.

But the science of surgery did progress, and it gradually made inroads upon the field of the *orthopedist*, and he soon saw many of his pet deformities, which had been to him through long years a source of pleasure and remuneration, filched by the skilful and investigating surgeon.

His failures in the treatment of club-foot and in many other deformities were well known to the surgical world, notwithstanding the boasted statements and the praise of patients cured.

The first tenotomies of Stromeyer began the beginning of the end of senseless mechanical work in certain forms of severe club-foot.

The work of McEwen, in more recent days, in bone deformities marks another era, and has taken from the *orthopedist* a large and important slice of his practice.

The work of Volkman, Koenig and others in joint diseases has made it extremely uncomfortable for the gentlemen who see nothing but a brace and strap for the treatment of such diseases. And so I might go on *ad infinitum* to show where general surgery has gradually made inroads upon the work of the *orthopedist*, until to-day

they have but little left; and this consists in the adjustment of braces to a very limited number of deformities, and frequently at the suggestion of the general surgeon, who condescends to operate for them when called upon.

These facts have stimulated to action another very important class of men who are known as *orthopedic surgeons*, and who claim that these deformities and many other diseases heretofore not included, and now treated by the general surgeon in a general way, come justly in their field.

These orthopedic surgeons believe in *orthopedic surgery*—they believe in mechanical work, whether by the adjustment of a brace or the use of the knife. They believe also that a thorough knowledge of pathology, surgical bacteriology and etiology is the only safe guide to treatment. They believe that a perfect knowledge of surgery and surgical laws is all important.

The combination of mechanical with surgical work constitutes *orthopedic surgery*. One divorced from the other makes general surgery and *orthopedy*. To illustrate:

Only a few decades ago the world was blessed or cursed with a specialist known as the oculist. He fitted glasses and did some other unimportant work about the eye. The general surgeon operated upon cataract, squint, removed the eyeball, and treated trachoma and other diseases of the eye. His field of work was so large that he had but little time to devote to the study of diseases of the eye.

A few of these oculists began the work, and, as a result, the world is now blessed with a most important special department of surgery known as ophthalmology. These men do all of the work of the older oculists. They adjust glasses. They have made grand discoveries in the ophthalmological world. They are in fact surgeon and oculist combined.

Less than half a century ago gynecology was limited to a few diseases of women, and the works of the older authors led us to believe that about all a woman was ever afflicted with was ulceration of the cervix. The gentleman who made his local applications and treated his patients with pills, pukes, purgatives, and pessaries, was known as a woman doctor. He was a general practitioner, and paid special attention to diseases of women; but his patients did not recover, and the general surgeon began to investigate his work.

Others also who had been women doctors began investigation, and the result is the grand specialty known as gynecology, and to-day the woman doctor is the gynecological surgeon, and he includes in his field not only ulceration of the cervix, but all of the diseases connected with the generative organs of the female, including the capital operation of cœliotomy.

The reason why these specialists took from general surgery the subjects which they now treat, is because, by special study and practice, they advanced and did better work and got grander results. These published results completely routed the general surgeon, whose time was too much taken to give special study to the subject. They won the battle in a fair fight upon the field of thought, and the profession of medicine awarded them the victory.

What, in your opinion, would have been the effect upon the specialty of ophthalmology if the gentleman away back there who fitted spectacles and was contented to be called an oculist had said: It is wrong for us to remove a lens, men who are educated as surgeons can do that? Suppose he, in his infinite stupidity, had said the adjustment of these glasses will cure the lens and return the sight, hence the knife is not to be used; it is wrong. Many of them did say just that. But investigators said we can improve upon the operation for cataract, and the cry was, give us more and better work. They discovered the cause, and their results won for them the confidence of the profession, and this specialty came to stay.

Where would gynecology be at the present moment if the general practitioner had continued his work. His practice would to-day be limited to his field of vision when applied through a speculum. But, thanks to McDowell, Battey, Emmet, Sims, Polk, Tait, Keith, Wells, Martin, Hanks, Dudley, and a host of others the field was widened, and their work won for gynecology the proud distinction it now enjoys in spite of the general surgeon. I might go on to illustrate with other important special departments of surgery and medicine, but time will not allow.

So we see that we are gradually drifting to that high standard of excellence attained by other departments of medicine, if we may be allowed to judge from the work of many of our most eminent orthopedic surgeons. We are forging ahead. We are rapidly becoming independent of the general surgeon and accepting his established

scientific facts. We are attaining a perfect knowledge of his operative methods and applying this knowledge, together with our mechanical methods, to the successful prevention and cure of deformities.

The question of what diseases or deformities are to be included in our specialty will depend entirely upon our results, and the general profession will be the umpire. Mr. Edmund Owen, of London; Kirmisson and Rédard, of Paris; Schede, Hoffe, and Beeley, of Germany; Lorenz, of Vienna, and Kaptein, of Holland, are among the orthopedic surgeons of Europe who believe in orthopedic surgery in all that word implies. In our own country, I am pleased to say, are many who believe the same.

One of the best definitions which has been offered for orthopedic surgery is that of Dr. Gibney, printed in the *New York Medical Journal*, November 7, 1891. It is: "that department of general surgery which includes the prevention, mechanical treatment, and the operative treatment of chronic and progressive deformities." But I can see no reason why acute joint disease attended with a deformity should not be treated by the orthopedist; then by adding the word "acute," it seems to make the definition a very good one.

The able text-book on *Orthopedic Surgery* by Prof. Hoffa does not include in its pages the subject of chronic joint disease. He does not include Pott's disease of the spine. Why include Pott's disease of the spine and not joint disease? In America the orthopedist and the orthopedic surgeon include in their list of orthopedic subjects both joint disease and Pott's disease of the spine. I cannot see why both should not belong exclusively to our specialty. Bradford and Lovett also include certain forms of paralysis in their recent text-book, with which I agree. And then, again, many members of this Association include in their work the treatment of fractures of the neck of the femur, and with them I fully agree. But why fractures of the neck of the femur and not all fractures? If all fractures are to be treated, why not dislocation? It is my earnest conviction that within a very few years fractures and dislocations will be treated by the orthopedic surgeon. These are conditions requiring the highest degree of mechanical knowledge and skill. Excisions of joints for chronic diseases, operations upon the spine for paralysis following Pott's disease, belong decidedly to the orthopedic surgeon, for the following reason:

Such cases are more frequently treated to-day, prior to excisions, by the orthopedic surgeon. And then, after excisions have been performed, mechanical treatment is necessary, covering over periods of months, and even years. Unquestionably, if all joint diseases of an acute or chronic nature were handed over to the skilful orthopedic surgeon, much better work would be done, and many a child would be saved from a cripple's life.

Working and teaching as I have for years in general surgery, I think I can speak, without prejudice to the general surgeon, upon this subject. I know that the general surgeon is too much occupied in his general work to carry out a prolonged treatment after his excisions; and then to hasten recoveries he is apt to resort to the knife when mechanical means would be better. These are the reasons why this class of joint diseases, either acute or chronic, should be forever claimed by the orthopedic surgeon.

All kinds of bone deformities requiring osteotomies or osteoclasis should be classified with orthopedic work. We readily see, then, that the orthopedic surgery of the future contemplates a wider field and the application more frequently of operative interference. If any orthopedic surgeon feels that he is not competent to do his work, let him call in the general surgeon. Let him do that for a few years, and he and his work will be seriously impaired.

Hernia unquestionably should be classified as an orthopedic subject. It is as important and as difficult to adjust a support to remedy a hernia as a splint to hip-joint disease, and frequently, by mechanical means, herniæ are cured.

In the Hospital for Crippled and Ruptured, New York, hernia is one of the diseases there treated, and it is recognized as an important part of their orthopedic work, and justly it should be. In the early history of that institution, cutting operations were, as I understand it, entirely dispensed with, not only for hernia, but all other deformities.

But under the present management the institution has been gradually raised to a higher plane, and to-day it ranks with our best institutions. I find now, when mechanical treatment fails in hernia, that an operation is performed to relieve the sufferer, and the same is true of joint diseases and deformities.

I visit Boston and its well-equiped Children's Hospital; there I witness similar work to that I now see in our best orthopedic

hospitals for the crippled and ruptured—operative work combined with mechanical, making indeed an orthopedic hospital, cared for by *orthopedic surgeons* and not *orthopedists*; and the work done by these institutions and the statistics which they will publish will go far toward divorcing many of the diseases which we now claim should be given to us from general surgery.

I visit other institutions in England, France, in this country, and especially in New York City, where surgical work is entirely dispensed with; where abscesses are allowed to burrow and sequestra in joints, to macerate in corroding pus, eventually either to kill the patient by infection or, fortunate for the patient, to be discharged as débris; where bow-legs and genu valgum in children of maturer age are still treated with braces, and patients suffering from suppuration regarded as hopeless or of doubtful recovery are transferred to other institutions to linger, and if recover, hopelessly crippled or more frequently die.

Fortunately for the profession, reports are published from all of these institutions which are an open book, and they who are not blind can read and judge of the comparative work performed. So enthusiastic was one of the advocates against non-surgical interference of joint disease that he made the statement upon the floor of the New York Academy of Medicine that "*in his report for the past year he was happy to say that of the large number of cases suffering from abscesses which had been treated in the institution where he had charge not one had been opened.*"

Publishing broadcast to the profession of medicine statements of this kind, printing statistics which are bristling all over with failures and unusually bad results, the large mortality in institutions where these cases are sent to die has done more to degrade orthopedic surgery to the low level which it found only a short time ago than all the ignorance of the dark ages of the past.

No member of this profession, be he orthopedist, oculist, or woman doctor of the past, has the right to violate well-established surgical laws, based upon scientific and clinical experimentation and laboratory truths, and he who does that will no longer drag these specialties down from the high pinnacle where a few men in this and other countries have placed them; but he will find himself floundering in

the mud and mire of condemnation so deep that his presence and work in our professional world will be ignored.

In the New York Post-Graduate School and Hospital the faculty a few years ago thought proper to establish an Orthopedic Department and in my opinion it is one of the wisest steps taken by that institution. A large portion of that beautiful building, which cost us nearly half a million of money, has been set aside for this work. Wards especially built, large dispensary rooms properly arranged, and convenient machine shops for the making of free braces for the unfortunate cripples, combine to make it a well-equipped orthopedic institution. The work in that department will give to it its character. Not only will mechanical appliances be adjusted there, but also, when necessary, operations performed. The staff of surgeons will strive to make that a department of orthopedic surgery, and shall hope to give from time to time to the profession of medicine data which may help to establish or disprove many theories.

The orthopedic surgeon of the future will be a man who has been thoroughly schooled in all the departments of medicine, who will have a perfect knowledge of pathology, surgical bacteriology, and anatomy. He will have added to this knowledge a general practice of at least twelve years. With all of these acquirements, and by his superior work, he will secure for our specialty the subjects which are rightfully ours. He will be fully competent to do orthopedic surgery as it should be done. He will be able to draw the line sharply and elevate his department as high as that of any other specialty, not excepting general surgery.

Orthopedic surgery when thus contemplated is a grand specialty. It is as important as that of general surgery. When this stand has been taken *colleges will want professors of orthopedic surgery.* We will no longer be called a society of buckle-and-strap men. We will include in our membership the best pathologists, general surgeons and anatomists that this broad Republic can furnish. The *orthopedist* will take the position that he chooses. The orthopedic surgeon will move on that high plane of scientific work which will not be the execration but the admiration of the entire profession of medicine.